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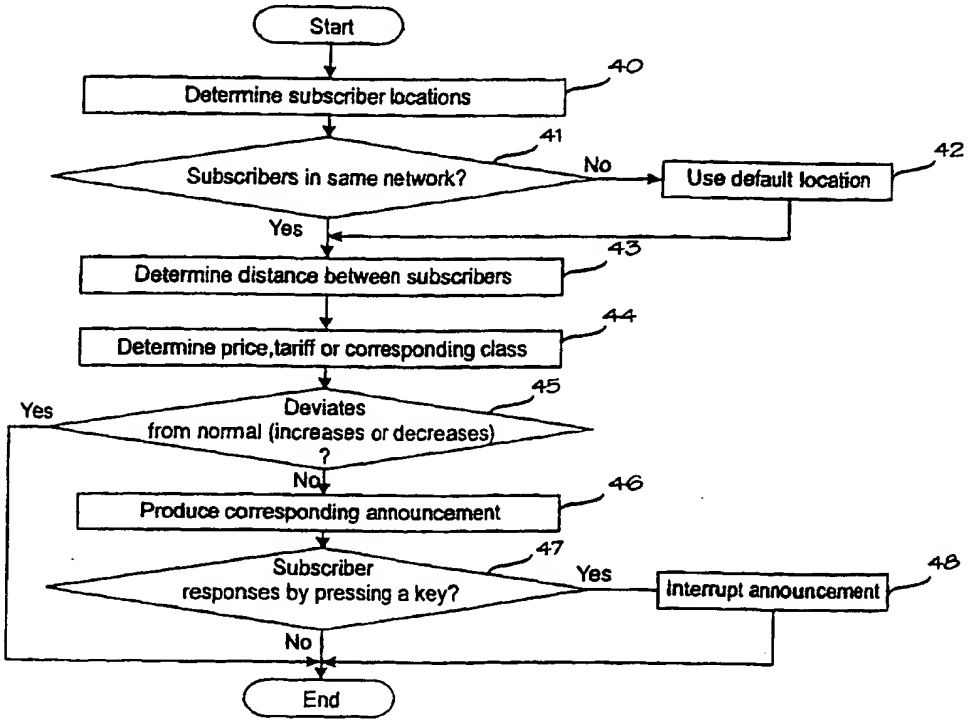
(54) Title: IMPROVED PRICE OR TARIFF FORMATION FOR A CALL

(57) Abstract

A method of determining a call price or an element thereof, such as a tariff, in a telecommunication system comprising at least one centre (MSC1, MSC2) and supporting the moving of at least one subscriber terminal (MS1, MS2) and maintaining current location information on mobile subscriber terminals. A call comprises at least a first, i.e. the calling, subscriber terminal (MS1) and a second, i.e. the called, subscriber terminal (MS2). In accordance with the invention, a data structure (301, 302) is formed whereto location information on the subscriber terminals (MS1, MS2) belonging to the call is supplied as input, and which, on the basis of the location information, indicates a distance parameter depending on the distance between the subscriber terminals. The distance can be measured along a straight line or via cables (201 to 205). Location information of a corresponding gateway mobile switching centre (GMSC) can be used for a subscriber located in another operator's network. This distance parameter is used for determining the call price.



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IMPROVED PRICE OR TARIFF FORMATION FOR A CALL

BACKGROUND OF THE INVENTION

The invention relates to improving price or tariff formation of a call, particularly in a cellular mobile communication system utilizing an intelligent network. A call price refers to the total charge of a call. Depending on the situation, the price can be divided in two partial prices, the first being paid by an A subscriber, i.e. the calling subscriber, and the second being paid by a B subscriber, i.e. the called subscriber. A tariff refers to a call price element which comprises a lump tariff or time tariff or both. The tariff can vary according to the day and time of day. The invention is described by means of a GSM system and the terms thereof, but the invention can also be used in or applied to other types of mobile communication systems.

Figure 1A shows the relevant parts of a cellular mobile communication system. MS1 and MS2 are mobile stations, the MS1 being located in a cell C1 and the MS2 in a cell C2. BTS1 and BTS2 are base transceiver stations. MSC1 and MSC2 are mobile switching centres. For the sake of clarity, network elements between centres and base transceiver stations, such as base station controllers and transcoders, are not shown. In Figure 1A, the MSC1 and MSC2 are located in different operators' networks, the centre therebetween being called a gateway mobile switching centre GMSC. A home location register HLR is the home location register of the mobile stations MS1 and MS2, and a corresponding visitor location register VLR1 and VLR2 is connected to the centres. The location of mobile stations moving in the area of a respective centre is updated in the visitor location register with an accuracy of a location area. A location area typically comprises several cells. SCP is a service control point of an intelligent network service and SSP is a service switching point. IP is an intelligent peripheral which produces more complex voice announcements by means of speech synthesizers than a typical switching centre itself is capable of producing.

When a user of the mobile station MS1 is to call a user of the mobile staion MS2, call setup proceeds in the following manner. In step 2, a mobile station MS transmits a call setup request SETUP. In step 4, the request proceeds to the centre MSC1 serving the mobile station MS1, and in step 6, to the gateway mobile switching centre GMSC. In step 8, the GMSC analyzes the B subscriber's MSISDN number and transmits a routing information inquiry

to the B subscriber's home location register HLR. On the basis of the MSISDN number, the HLR finds the B subscriber information comprising the address of a visitor location register (in this case the VLR2) serving the B subscriber. In step 10, the HLR transmits to the VLR2 a PROVIDE ROAMING NUMBER request for allocating a roaming number. In step 12, the VLR2 returns the allocated roaming number MOBILE STATION ROAMING NUMBER MSRN to the home location register HLR. The roaming number space is defined such that the call is always directed to a centre whose visitor location register has allocated the respective roaming number. In step 14, the HLR returns the B subscriber information to the gateway mobile switching centre GMSC, which routes the call to the MSC2 by means of the roaming number in step 16. In the present example, the MSC2 detects, on the basis of the roaming number MSRN, that the call's destination is in its own centre's area. In step 18, the centre MSC2, for setting up the call, inquires information on the called subscriber of its own visitor location register VLR2. The VLR2 returns the necessary information in step 20. The MSC2 now sets up the call. This is indicated by arrows 22 and 24.

In step 26, the user of the MS2 answers the call. Arrows 28, 30, 32 illustrate that the information on the MS2 answering the call is transmitted to the centre MSC1. The answering message is typically an ADDRESS COMPLETE MESSAGE ACM in the step wherein the MS2 answers paging, and an ANSWER MESSAGE ANM in the step wherein the user of the MS2 pushes the answer key in his or her telephone. Only in this step is the centre MSC1 informed of the exact location cell C2 of the MS2. Arrows 40 and 42 denote the last steps of the call setup wherein the information on the MS2's answer is conveyed to the calling subscriber, i.e. the user of the MS1.

A relatively complex situation in which the MS1 and the MS2 are located in different operators' networks has been described above. If the MS1 and the MS2 are located in the same network's area, the situation is slightly simpler since no gateway mobile switching centre GMSC is necessary and the MSC2 inquires the routing information of the home location register HLR. If the MS1 and the MS2 are located in the same centre's area, the situation is even simpler since signaling between the centres becomes redundant.

In common mobile communication systems, if both parties are located in the same network, the call price is determined only on the basis of the time and length of the call. If the MS1 and the MS2 are located in the same

country, the calling subscriber usually pays for the entire call. If the mobile station roams in a visited network, the home network operator pays the operator of the visited network for the use of the trunk circuits. If the MS1 and the MS2 are located in different networks' areas, the calling subscriber usually pays for the call as far as the gateway mobile switching centre and the called subscriber pays for the call from here onwards.

Tariff collection is generally supported by means of an intelligent network. Referring further to Figure 1A, in step 34, the centre MSC1 transmits an INITIAL DETECTION POINT IDP message to the intelligent network service control point SCP1 to initiate an intelligent network service. Intelligent network service triggering information is typically obtained from the VLR1 serving the A subscriber. The IDP message conveys the information on the location of the MS1 and the MS2, or at least on the network in the area of which the MS1 and the MS2 are located. In step 36, the SCP1 transmits information on the call tariff to the centre MSC1, for example by transmitting a SEND CHARGING INFORMATION SCI operation. Alternatively, the service control point SCP can independently serve to determine the call price and transmit information on what the call charge is based on only after the call. The SCP can transmit this information either to the centre (here the MSC1) or directly to the charging centre (not separately shown in Figure 1A).

The bottom left corner of Figure 1A shows an alternative wherein the B subscriber, i.e. the called subscriber, is a subscriber of a wired network PSTN. In this case, the location of the B subscriber is found out in the wired network numbering plan.

A commonly used mechanism of indicating a tariff in a mobile telephone network is that a tariff rate of the call is known on the basis of a selected number and a subscriber contract type (subscriber class, MS classmark). The tariff rate can also be obtained from the SCP. On the basis of the tariff rate, the lump tariff and/or time charge used at a given time is known. In other words, the advice of charge AoC E parameters used at a given time are known on the basis of the tariff rate, the AoC E parameters indicating how often and how many call charge metering impulses are produced. A certain price is determined for a call charge metering impulse. E parameters indicate, for example, the free time in the beginning of a call, call charge metering impulses produced when the free time ends, call charge metering impulses produced at

specified points of time and the time therebetween. Either a lump charge or time charge can be associated with the call.

The bottom right corner of Figure 1A illustrates how location and tariff information is transferred to a network element that determines the call price, which in this case is the network element MSC1. The MSC1 knows the A subscriber cell in step 4 and the B subscriber cell in step 32, transmitting the cells in step 36 to the service control point SCP, which in step 36 returns the call price, tariff or any parameter associated with price formation, such as an e-parameter.

A problem or drawback of the common technique described above is that mobile telephone subscribers in particular find the price or tariff formation unfair. They are usually accustomed to price setting in fixed networks with a clear distinction between local calls and long distance calls. In the known mobile communication systems, however, all calls at least in the same operator's network are usually similarly priced, the operator often charging much more for these calls than for the calls in the wired network. The known mechanisms are incapable of taking the actual distance between the calling subscriber and the called subscriber into account. If, for example, Figure 1A is interpreted in such a manner that all elements and both mobile stations MS1 and MS2 in the figure are located in the same operator's area, the call price is the same regardless of whether the mobile stations are located in the same centre's area (perhaps even in the same cell) or at the extreme ends of the network. If the mobile stations MS1 and MS2 are located in different centres' areas, more network elements are necessary for the call setup (use of resources being more extensive) and, in addition, the network operator may be compelled to pay rent for the call for the common trunk network. A further problem that makes using the distance between the subscribers for determining the call price or tariff even more difficult is that the calling subscriber usually needs to know the price/tariff on the call in advance. For the above-mentioned reasons, all calls are priced - to be on the safe side - as long-distance calls by the mobile communication operators.

A partial solution to the above problem is the use of certain fixed subscriber-specific cell groups. One such arrangement is disclosed in WO96/20571 publication similarly assigned. In the known arrangements, however, the call price or tariff does not depend on the actual distance between

the subscribers; one or more predetermined cells having lower call prices are only formed in the known solutions.

BRIEF DESCRIPTION OF THE INVENTION

An object of the invention is thus to provide a method and an apparatus implementing the method so as to enable the above-mentioned problem to be solved, in other words the call price or tariff should depend on the distance between the subscribers. The objects of the invention are achieved by a method and a system that are characterized by what is said in the independent claims. The preferred embodiments of the invention are disclosed in the dependent claims.

The invention is based on the idea that a data structure is maintained in a network element participating in call price setting, location information on subscriber terminals belonging to the call being supplied as input to the data structure with available accuracy. On the basis of the data structure and the location information on subscriber terminals, a distance parameter depending on the distance between the subscriber terminals is determined, the parameter being used for forming the call price or tariff. If distance-based price formation is used during the call, the location information is known with an accuracy of a cell. Alternatively, a separate service can be created to produce, prior to the call, an estimate of the call price or tariff. In such a case, the location of the called subscriber is only known with an accuracy of the location area.

Within the scope of the present application, the word "distance" is to be interpreted in a broad sense. Distance can be measured straight or along the cable. The distance-based calculation of the invention is one element, but not necessarily the only element, of call price or tariff. Distance can also be corrected or weighted by various factors, depending for instance on how actively the operator wants to increase traffic in a given area, or how expensive transmission equipment and cables are provided between the network elements participating in the call. To minimize the necessary tables, the cells can be divided into cell groups that can correspond to location areas known per se, or the cell groups can be a concept separate from the location area. Correspondingly, the concept "price of tariff" is based on the fact that some calls have a fixed price while some calls only have time charge, and some have a

combination of the two. Whether it is more advantageous to use a price or tariff depends on the situation.

Price setting based on the distance between subscribers in accordance with the invention causes some new problems. First, the calling subscriber does not know the exact lump charge and/or time charge for the call. This problem can be solved by an appropriate announcement, which can be a voice announcement, short message or a text announcement (a USSD), for example. If such an announcement is highly detailed (comprising for example a lump tariff and time charge), annoying delay may occur before the subscribers are capable of speaking to each other. This can be solved, for example, by defining a function, for example a key in the telephone (the asterisk key, for instance) such that pressing the key prevents or interrupts a price announcement. A further problem is that a decision has to be made on what is announced to the called party while the call price announcement is being produced to the calling party. In any case, the same announcement cannot be produced to the called subscriber since the call price usually varies according to the call party (a called subscriber only pays for the call while abroad or possibly in case of a collect call). If no announcement is produced to the called subscriber, the situation becomes confusing for him or her, since his or her telephone is ringing but no speech can be heard, however, before the price announcement to the calling party is over or the calling party has interrupted the announcement. Most preferably, the called party is provided with a short announcement, for example a "call coming" or other such announcement.

Another approach to announcing call price or tariff is that a service of an entirely new type is formed in the mobile communication system, most appropriately in the service control point SCP. The service can be called using a service number reserved for the purpose. When this service number is called and the B subscriber number is given as a parameter, the service retrieves the B subscriber location information from the serving visitor location register and produces an estimate of the call price. Prior to call setup, the B subscriber location is only known with an accuracy of the location area, so the price announcement cannot be accurate. The call price can be estimated according to the worst case, i.e. the most expensive cell in the location area to enable the A subscriber to know at least the upper limit of the call tariff. Alternatively, the A subscriber can be informed of the call tariff range, i.e. the lower and upper limits.

An advantage of the method and system of the invention is that call price is more justly determined than when using the prior art technique. In the present context, "justly" mainly refers to the call price being based on network resources and/or resource allocation situation utilized in a more accurate way.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is now described in closer detail in connection with the preferred embodiments with reference to the accompanying drawings, in which

Figure 1A shows parts of a mobile communication system utilizing an intelligent network which are relevant for the invention, different steps of call setup and relaying of subscriber location information to a service control point serving the calling subscriber;

Figure 1B shows relaying the called subscriber location information to a service control point serving the called subscriber;

Figure 2 illustrates determining a distance between mobile stations and dividing cells into cell groups;

Figure 3A and 3B show different data structures for determining distances between the cells and cell groups;

Figure 4 is a flow diagram illustrating an embodiment of the invention; and

Figure 5 is a signaling chart illustrating call tariff announcement to the A subscriber as a separate service, prior to call setup.

DETAILED DESCRIPTION OF THE INVENTION

Figures 2, 3A and 3B show different possibilities of determining a distance between mobile stations. Figure 2 shows a group of cells having a unique cell identifier 1-1, ..., 1-10, 2-1, ..., 2-10, ..., 4-4. Figure 2 encompasses an origin, i.e. zero point 200, from which X and Y coordinates are calculated for each cell. These coordinates are stored in a table 301 shown in Figure 3A. For illustrative reasons, only the coordinates of cells comprising a network element or a mobile station in Figure 2 are provided in the table 301. Assume that the mobile stations MS1 and MS2 are located as shown in Figure 2. When a network element determining a call price or tariff (which can be the centre MSC1 or the service control point SCP connected thereto) knows the location cell identifiers of the mobile stations MS1 and MS2, 1-1 and 2-10, respectively, the network element can look up the table 301 to see that the cell

coordinates are (7, 35) and (138, 47), respectively. Employing simple trigonometry, the geographical distance obtained is 132 units, which can be kilometers or arbitrary computational units.

A characteristic of a simple geographical distance is that the geographical distance between mobile stations located near each other is almost zero. Usually, however, a call must be established via at least one telephone centre, the operator probably being uninterested in whether the mobile stations MS1 and MS2 are located near each other or on the opposite sides of the centre. This problem can be solved by using the table in such a manner that the distance between the mobile stations MS1 and MS2 is formed as a sum of three subdistances. Of these subdistances, two are determined on the basis of the distance between the mobile stations MS1 and MS2 and the centres MSC1 and MSC2 serving the mobile stations. The third subdistance is determined on the basis of the distance between the centres. The distance can be zero, in case the same centre serves both subscribers. If more than two centres are provided between the subscribers, there can also be a plurality of the third subdistances. In Figure 2, if it is assumed that the coordinates of the cells 3-3 and 3-9 are used as the coordinates of the centres MSC1 and MSC2, respectively, the following subdistances can be calculated from the coordinates:

MS1 - MSC1: 38 units
MS2 - MSC2: 24 units
MSC1 - MSC2: 83 units

Calculated in this manner, the distance between the mobile stations MS1 and MS2 (i.e. the cells 1-1 and 2-10) becomes 38 + 24 + 83 = 145 units.

Figure 3B shows a table 302 wherein distances between the cells can be directly seen without any trigonometry. For example, by employing the coordinates 1-1 and 2-10, the distance between the mobile stations in Figure 2 becomes 132 units. The problem of a table of this type is that the table increases in size according to the square of the number of cells. The table size can be limited by, for example, dividing the cells into cell groups CG, designated in Figure 2 by cell groups CG1 to CG5 drawn in a bold line. If, in a table of the table 302 type, single cells are replaced with cells groups each having 6 cells in the average, the table size decreases by a factor of 36. Another way to decrease table size is to use the subdistances described above and to form,

for each centre, a separate table having only entries for cells controlled by said centre.

In the above examples, the distances between the cells are measured along a straight line. According to one alternative, distances between the cells are measured by a cable, in which case the distance between the mobile stations MS1 and MS2 would be the total length of cables 201, 202 and 203. To this, naturally, can be added various resource factors according to the resources used (air interfaces, transmission equipment, etc.).

The above is a description how call price or tariff is determined in accordance with the invention, assuming that both call parties are located in the same operator's network. If the parties are located in different operators' networks, the technique described above can be separately applied to the calling subscriber's network, to the called subscriber's network and to the third networks combining the two networks. Figure 1A shows a situation in which both subscribers' location information is relayed to a service control point serving the calling subscriber. In step 4, the centre MSC1 knows the cell C1 of the calling subscriber. In steps 26 to 32, the cell C2 of the called subscriber (MS2) is determined. In step 34, the C1 and C2 are conveyed to the SCP of the calling subscriber (MS1), the SCP determining the call price or tariff and transmitting it to the MSC1 in step 36.

Figure 1B shows how similar technique can be applied to the called subscriber's network. The numbering corresponds to that of Figure 1A, but step 30 is followed by step 31a wherein the cell C2 of the called subscriber (MS2) is conveyed from the gateway mobile switching centre GMSC to a service control point serving the called subscriber, the service control point returning the call price to the GMSC in step 31b to the extent the called subscriber is charged for the call. In this case, in both subscribers' price/tariff formation, the location of the gateway mobile switching centre GMSC can be used as the location of the other subscriber.

It is usually required that the calling subscriber must be able to know the price of a call no later than in the beginning of the call. The common telecommunications technique enables the call price to be known in such a manner that the operator charges the same price regardless of how the subscribers are located with respect to each other. When the technique of the invention is used, the call price/tariff cannot be exactly found out until the called subscriber answers the call and his or her location cell becomes known. When

the price/tariff is found out, it must be announced at least to the calling subscriber. The announcement can be in plain text or an appropriately coded sign. Most suitably, a plain text announcement is produced in a language determined on the basis of the subscriber contract or subscriber information. It can be audible or readable. An audible announcement can be generated for instance in such a manner that the service control point SCP transmits to the IP unit a PLAY ANNOUNCEMENT operation having the announcement indicating the call price/tariff as a parameter. Prior to this, a CONNECT TO RESOURCE operation is provided on the basis on which the centre MSC/SSP routes the voice announcement produced by the IP unit to the calling subscriber terminal MS1. Hearing the voice announcement may be unnecessary, if the calling subscriber knows with sufficient accuracy where the called subscriber is located. It is thus preferable if producing the price or tariff announcement can be prevented or interrupted by pressing a predetermined key in the mobile station (for example "#") before said announcement has been produced in its entirety. Alternatively, it is feasible that producing the announcement could be interrupted when the calling subscriber starts speaking.

A voice announcement indicating the call price or tariff can also be coded into a group of short voice signals having a characteristic, such as a number, duration or voice pitch, to indicate the call price or tariff. It is preferable, particularly in connection with such coding, to divide the call tariff into at most a few predetermined classes, the call price being indicated by producing a number n voice signals in case the call tariff belongs to class n. The advantage of such short beeps is that they can also be produced during the call if the distance between the subscribers and the call tariff change during the call.

According to an alternative, an announcement about the call price/tariff is transmitted as a data message, for example as a short message or a USSD message. According to a further alternative, an announcement indicating the call price or tariff is transmitted by producing an appropriate indication on the mobile station's display, by attaching, for example, one digit after the operator identifier to indicate the price class of the call.

A particularly preferable combination is one having a short voice signal and a short text announcement combined. The short voice signal can indicate that the call tariff deviates from normal or changes during the call. More accurate information can be produced on the mobile station's display in any manner described above. For example, one beep in the beginning of the

call can indicate that the call is less expensive than normally, and, correspondingly, two beeps that the call is more expensive than normally. One or two beeps during the call can indicate that the call tariff decreases or increases, respectively, as a result from handover, for example.

Figure 4 is a flow diagram illustrating an embodiment of the invention. In step 40, subscriber locations are determined. In step 41, it is checked whether both call parties are located in the same network. If one party is located in a different network, a default location can be used for that party (step 42). In step 43, the distance between the subscribers is determined. This is described in connection with Figures 2, 3A and 3B. Based on the distance, in step 44, the call price or its element, such as the tariff, is determined. This, in accordance with a preferred embodiment, can further be divided into a few price classes. In an optional step 45 it is checked whether the call price, tariff or price class deviates from normal. If so, in step 46, a corresponding announcement is produced to the subscribers who pay for the call (usually at least to the A subscriber). If the announcement is long, in an optional step 47 it is checked whether the subscriber replies with a predetermined press of a key, meaning that he or she wants to prevent or interrupt the reading of the announcement. If so, the announcement is interrupted or prevented from being provided in step 48.

The flow diagram in accordance with Figure 4 can also be applied during the call, in connection with handover, for example. In this case, it is checked in step 45 whether the call tariff increases or decreases as a result from the handover. In addition to handover, the call tariff can change for example when a frequency band is changed in a multifrequency network, from a GSM to a DCS, for example.

Figure 5 is a signaling chart illustrating the announcement of a call tariff to the A subscriber as a separate service, prior to call setup. Assume that the service is installed in the service control point SCP. In step 5-1, the user of the mobile station MS1 calls this service and indicates the number of the mobile station MS2. In step 5-2, the SCP inquires the address of a visitor location register serving the mobile station MS2 of the home location register HLR. In step 5-3, the HLR returns the VLR2 address. In step 5-4, the HLR inquires the location area of the mobile station MS2 of the VLR2. In step 5-5, the VLR2 returns the MS2 location area. In step 5-6, the SCP produces an announcement indicating the call tariff, possibly via the IP unit. To free the user of the

MS1 from redialling the number of the MS2 in order to establish the actual call, the service can be extended such that in response to pressing a certain key, the call is directly connected to the MS2 after the price announcement. This is described in steps 5-7 and 5-8 in which the user of the MS1 accepts the call price and the SCP transmits a command to the centre MSC1 to establish a call to the MS2.

It is obvious to those skilled in the art that with progress in technology the basic idea of the invention can be implemented in various ways. The invention and its embodiments are thus not restricted to the above examples but they can vary within the scope of the claims.

CLAIMS

1. A method of determining a price, or an element thereof, such as a tariff, for a call in a telecommunication system wherein at least a first, i.e. the calling, subscriber terminal (MS1) and a second, i.e. the called, subscriber terminal (MS2, B) belong to the call;

characterized by

forming a data structure (301, 302) whereto location information on the subscriber terminals (MS1, MS2, B) belonging to the call is supplied as input;

determining a distance parameter depending on a distance between the subscriber terminals on the basis of said data structure and subscriber terminal location information; and

using said distance parameter for determining the call price or tariff.

2. A method as claimed in claim 1, **characterized** by the telecommunication system comprising cells (C1, C2) known per se, each having a unique cell identifier (1-1, 1-2, ...), and the location information on at least one subscriber terminal (MS1, MS2) being determined on the basis of the cell identifier or any parameter depending thereon, preferably a cell group (CG1, CG2, ...).

3. A method as claimed in claim 1 or 2, **characterized** by said data structure (302) operationally two-dimensionally corresponding to a table whose first coordinate is determined on the basis of the first subscriber terminal's (MS1) location information or any parameter depending thereon and whose second coordinate on the basis of the second subscriber terminal's (MS2) location information or any parameter depending thereon, and said distance parameter is readable at the intersection point of the coordinates.

4. A method as claimed in any one of the preceding claims, **characterized** by the telecommunication system comprising or being operationally associated with at least one gateway mobile switching centre (GMSC) for connecting to other networks, and location information being determined for each gateway mobile switching centre (GMSC); and if it is detected that the second subscriber terminal (MS2) is located in the area of such other network, the call price for the first subscriber terminal (MS1) is determined such that location information on a corresponding gateway mobile

switching centre (GMSC) is used as the location information on the second subscriber terminal (MS2).

5. A method as claimed in claim 1 to 4, **characterized** by said data structure (302) indicating said distance parameter substantially on the basis of the geographical distance between said subscriber terminals (MS1, MS2).

6. A method as claimed in claim 1 to 4, **characterized** by said data structure indicating said distance parameter substantially on the basis of such a distance between said subscriber terminals (MS1, MS2) which is calculated by cables in the telecommunication system.

7. A method as claimed in claim 6, **characterized** by said data structure (301, 302) substantially indicating a number of subdistances, two of which are determined on the basis of the distance between said subscriber terminals (MS1, MS2) and corresponding centres (MSC1, MSC2) serving the subscriber terminals, and a third subdistance is determined on the basis of the distance between these centres; and said distance parameter depending on the distance between the subscriber terminals is determined on the basis of said subdistances.

8. A method as claimed in any one of the preceding claims, **characterized** by at least one subscriber terminal (B) being connected to a wired network (PSTN, EXC), the location information of the subscriber terminal being determined on the basis of a wired network subscriber number.

9. A method as claimed in any one of the preceding claims, **characterized** by

creating a service for announcing the call price or tariff;

the first subscriber terminal (MS1) placing a call (5-1) to said service and indicating the number of the second subscriber terminal (MS2, B);

the service determining the location of the first subscriber terminal (MS1) and the estimated location of the second subscriber terminal (MS2, B), and, on the basis of this information, producing an estimate (5-6) of the call price or tariff to the first subscriber terminal (MS1).

10. A method as claimed in any one of the preceding claims, **characterized** by the call price or tariff being determined at least in the beginning of the call.

11. A method as claimed in claim 10, **characterized** by the call price or tariff being redetermined if the distance between the subscriber terminals (MS1, MS2) changes during the call.

12. A method as claimed in claim 10 or 11, **characterized** by producing, in connection with determining the call price or tariff, an announcement about the call price or tariff at least to the subscriber terminal (MS1) whose subscriber pays for the call.

13. A method as claimed in claim 12, **characterized** by said announcement indicating the call price or tariff being in plain text, preferably in a language determined on the basis of the subscriber contract or subscriber information.

14. A method as claimed in claim 12 or 13, **characterized** by said announcement about the call price or tariff being audible, preferably a group of short voice signals having a characteristic, such as a number, duration or voice pitch to indicate the call price or tariff.

15. A method as claimed in any one of claims 12 to 14, **characterized** by said producing of the announcement about the call price or tariff being prevented or interrupted if a predetermined response is received from said subscriber terminal before said announcement has been produced in its entirety.

16. A method as claimed in claim 12, **characterized** by said announcement about the call price or tariff being transmitted as a data message, preferably as a short message.

17. A network element participating in price or tariff formation for a call, preferably a service control point (SCP) in a telecommunication system wherein at least a first, i.e. the calling, subscriber terminal (MS1) and a second, i.e. the called, subscriber terminal (MS2, B) belong to the call;

characterized by said network element

comprising a data structure (301, 302) indicating, on the basis of location information on the subscriber terminals (MS1, MS2) belonging to the call, a distance parameter depending on a distance between the subscriber terminals, and

being arranged to use said distance parameter for determining the call price or tariff.

Fig. 1A

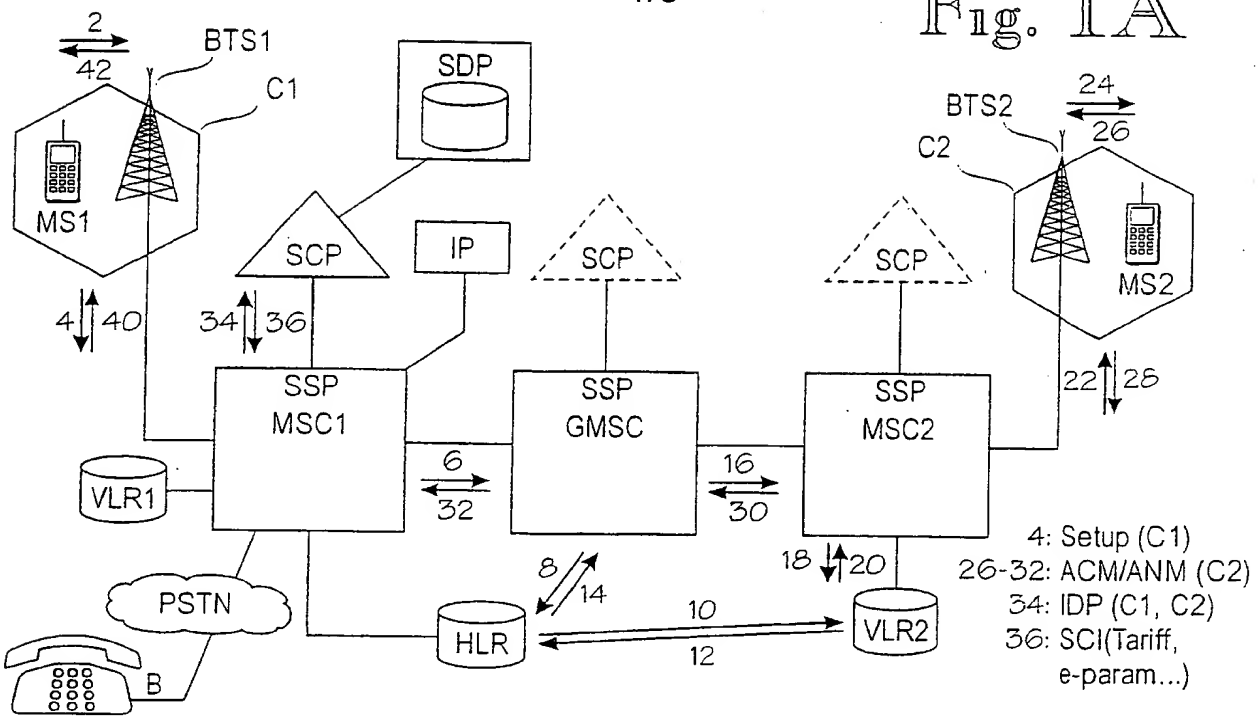
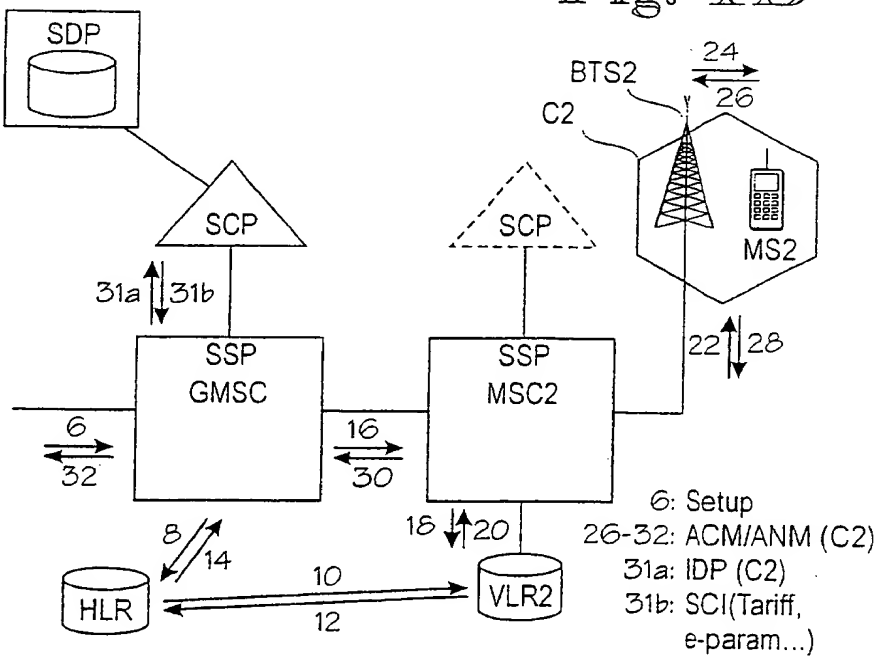


Fig. 1B



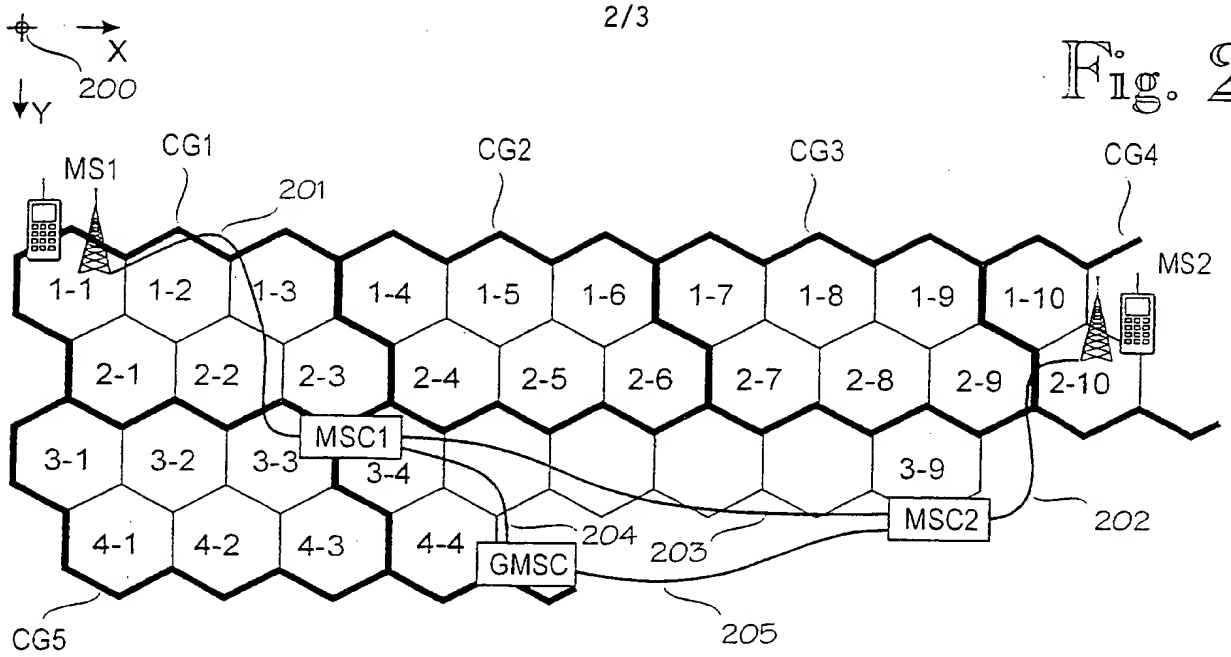


Fig. 2

301

Solu	1-1	1-2	1-10	2-1	2-10	3-3	3-9	4-4
X	7	21	132	14	138	35	118	55
Y	35	35	35	47	47	60	60	72

Fig. 3A

302

	1-1	1-2	1-10	2-1	2-10	3-3	3-9	4-4
1-1	0	14	125	14	132	38	114	60
1-2		0	111	14	118	29	100	50
1-10			0	111	14	100	29	85
2-1				0	124	25	105	48
2-10					0	104	24	87
3-3						0	83	23
3-9							0	64
4-4								0

Fig. 3B

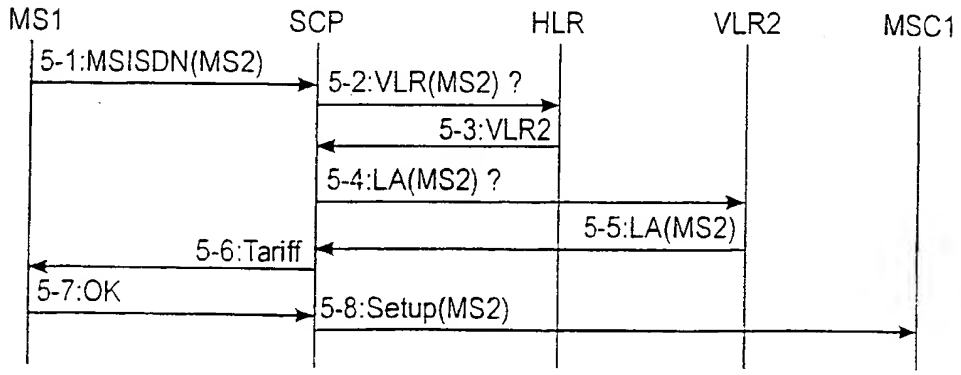
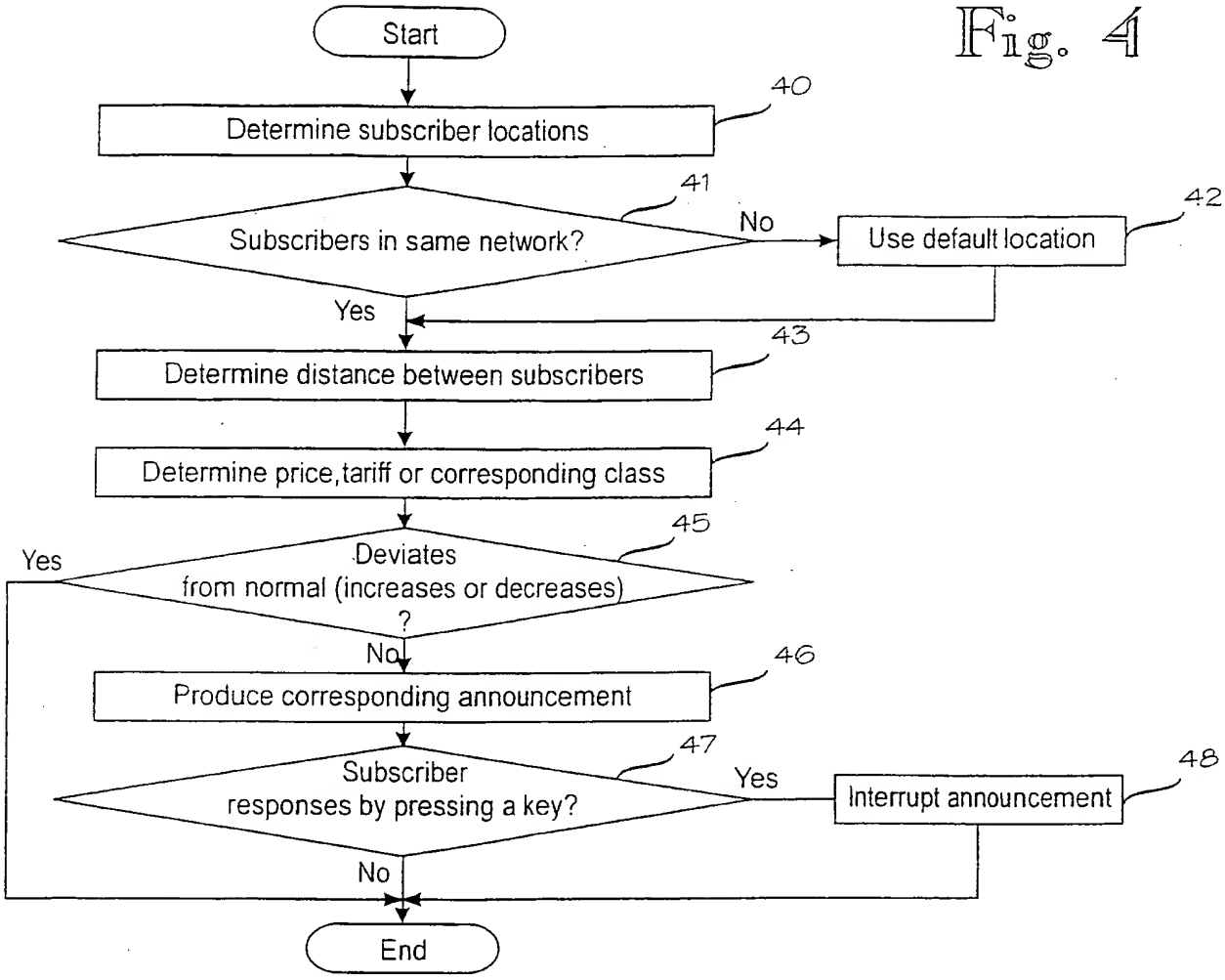


Fig. 5

Fig. 4


Start
Determine subscriber locations
40
Subscribers in same network?
41
No
Use default location
42
Yes
Determine distance between subscribers
43
Determine price,tariff or corresponding class
44
Deviates from normal (increases or decreases) ?
45
Yes
No
Produce corresponding announcement
46
Subscriber responses by pressing a key?
47
Yes
Interrupt announcement
48
No
End

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 99/00364

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04M 15/00, H04Q 7/38
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04M, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPIL, EDOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0526118 A2 (MOTOTOLA INC.), 3 February 1993 (03.02.93), column 6, line 5 - line 12; column 6, line 37 - column 7, line 1; column 7, line 16 - line 27, see summary of the invention --	1-17
A	WO 9807270 A1 (NOKIA MOBILE PHONES LTD.), 19 February 1998 (19.02.98), page 4, line 1 - line 15, figure 6, abstract --	1-17
A	EP 0568824 A2 (US WEST, INC.), 10 November 1993 (10.11.93), see summary of the invention --	1-17

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 October 1999	15-10-1999
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Patrik Rydman/mj Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 99/00364

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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P,A	GB 2332821 A (MOTOROLA LIMITED(INCORPORATED IN THE UNITED KINGDOM)), 30 June 1999 (30.06.99), see the whole document --	1-17
A	WO 9620571 A1 (NOKIA TELECOMMUNICATIONS OY), 4 July 1996 (04.07.96), See the whole document. Cited in the application. -- --------	1-17

INTERNATIONAL SEARCH REPORT

Information on patent family members

28/09/99

International application No.
PCT/FI 99/00364

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		NO 972893 A	20/08/97